

Experimental Results from the LLNL Large Area ICP.*

R.D. BENJAMIN, P.O. EGAN, C.S. MULLIN and R.A. RICHARDSON, LLNL.—We describe experiments to explore the issues associated with large-area inductively coupled plasma (ICP) sources for producing high density plasmas with potential use for processing 300 mm semiconductor wafers or even larger FPD substrates. Our initial source design experiments are done in a large (76-cm diameter) plasma source chamber and typically use planar ICP coils with diameters from 30 to 64 cm, driven at 13.56 MHz and coupled to the plasma through a 5-cm thick dielectric window. Plasma and system data are obtained for both Ar and N₂ over the pressure range 3-50 mtorr. RF inductive power was typically varied from 100-1200 W, but the system is capable of 5000 W. Diagnostics include Langmuir probes, B-dot probes, electrical circuit measurements and optical emission spectroscopy. Measurements will be compared with LLNL INDUCT94 plasma modeling codes described in the abstract of P. Vitello, et al. (this conference) and with commercial EM modeling codes. For proper choice of operating conditions, excellent plasma uniformity over 400 mm diameter can be obtained. Effects of pressure, power, RF coupling, and coil geometry on plasma density and uniformity will be presented.

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